Cochise Pincushion Cactus
(Coryphantha robbinsorum)

5-Year Review:
Summary and Evaluation

U.S. Fish and Wildlife Service
Arizona Ecological Services Office
Phoenix, Arizona

5-YEAR REVIEW

Species reviewed: Cochise Pincushion Cactus (*Coryphantha robbinsorum*)

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GENERAL INFORMATION

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Cooperating Field Office: None

Cooperating Regional Office: None

Methodology used to complete the review:

This review was completed by U.S. Fish and Wildlife Service (FWS) biologists in the Tucson Suboffice of the Arizona Ecological Services Office. In addition to the general solicitation of public comments published in the Federal Register (71 FR 20714), we solicited specific input on new information related to the conservation and natural history of the Cochise pincushion cactus (*Coryphantha robbinsorum*) from a number of individuals with a history of working on Cochise pincushion cactus research and conservation (see REFERENCES section).

We conducted a review of past and recent literature, public comments, the listing rule, and the recovery plan. Interviews with individuals were conducted as needed to clarify or obtain specific information. We prepared a preliminary draft review. This draft was reviewed by the FWS Arizona Ecological Services Office. Comments were incorporated, and the 5-year review and recommendation were then provided to the FWS Region 2 office for review and finalization. No peer review was conducted for this species due to the lack of controversy regarding the status of this species and our recommendation to leave the status unchanged. In addition, the lack of new information for review and analysis does not warrant peer review.

Background

FR Notice citation announcing initiation of this review: 71 FR 20714

Listing history

Original Listing
FR notice: 51 FR 952
Date listed: January 9, 1986
Entity listed: Species; in USA (AZ) and Mexico (Sonora)
Classification: Threatened

Revised Listing, if applicable
None

Associated rulemakings: None

Review History: None subsequent to listing.

Species' Recovery Priority Number at start of 5-year review: 8

Recovery Plan or Outline:
Name of plan: Cochise Pincushion Cactus (*Coryphantha* robbinsorum) Recovery Plan
Date issued: September 27, 1993
Dates of previous revisions, if applicable: None

REVIEW ANALYSIS

Application of the 1996 Distinct Population Segment (DPS) policy

Not applicable; the listed entity is not a vertebrate.

Recovery Criteria

The current recovery plan was approved in 1993. The objective of the recovery plan is "to outline steps to facilitate the recovery of the Cochise pincushion cactus and manage its essential habitat so that healthy populations can be sustained in their natural habitat" (USFWS 1993). However, in a more indirect fashion, the plan states that the objective is to de-list or remove the Cochise pincushion cactus from the Federal list of endangered and threatened species. While the format of the plan indicates that recovery criteria are contained within the plan, the actual content of the plan does not clearly define or present any recovery criteria for the Cochise pincushion cactus. A number of general "activities" are presented; the completion of which would be required prior to considering downlisting of the species. Most of these activities are quantifiable, but are not specifically defined as recovery criteria. These activities are followed with a more specific outline of recovery actions. The Executive Summary, under the Recovery Criteria section, states that the "demonstration through ten years of monitoring that viable populations are

being maintained" is needed for recovery. However, this criterion is not mentioned or explored further in the text of the recovery plan.

The following is the list of "activities" contained within the recovery plan. While not specifically defined as "recovery criteria" in the recovery plan, these activities could represent quantifiable criteria for the recovery of the Cochise pincushion cactus.

1. Develop landowner or public land management agency agreements that will ensure permanent protection and management.

This could be considered a recovery criterion by requiring that such agreements be in place prior to considering delisting. Known populations of the cactus do not occur on Federal public lands. In the U.S., they occur on Arizona State Trust lands, leased by a local landowner for livestock grazing. Regardless, no such agreements have been developed or completed. This is not to say that local landowners and land-management agencies are not implementing actions that contribute to the conservation of the Cochise pincushion cactus. The local landowner continues to be vigilant of the populations in the U.S. and has adjusted livestock management to reduce direct impacts to the known populations. Local USFWS (San Bernardino National Wildlife Refuge (SBNWR)) law enforcement personnel focus efforts in the occupied areas to reduce impacts from illegal immigration and drug smuggling. This recovery criterion addresses Listing Factor A – the present or threatened destruction, modification, or curtailment of its habitat or range.

2. Implement management measures that research studies indicate are needed to maintain habitat condition suitable for sustaining 50 high-density, viable populations with 300 plants in each population and that are linked with habitat maintaining low-density populations.

As a recovery criterion, this would mean that 50 high-density Cochise pincushion cactus populations of at least 300 plants each, and linked by habitat supporting lower-density populations, would need to be documented and delineated before delisting could be considered. Currently, only three high-density populations have been delineated. General survey work has been conducted in Arizona throughout the likely range of the species (Zimmerman 1985), but no additional high-density populations have been delineated beyond the three monitoring plots established by the USFWS (Rutman 1989, Schmalzel 1995). Currently, there are fewer than 75 plants within the three monitoring plots; down from a high of approximately 185 plants in 1992 (Figure 1). Additional survey work funded through section 6 will be completed in Mexico in 2007 by Dr. Tom Van Devender. There is at least one population in Mexico (Lopresti 1984), but there is no information on density for this location or recent survey information. Dr. Van Devender will try and locate this population and survey in suitable limestone habitat in Mexico. The extent of low-density populations has not been determined in the U.S. or Mexico. This recovery criterion addresses Listing Factor A – the present or threatened destruction, modification, or curtailment of its habitat or range, and Listing Factor E – other natural or manmade factors affecting its continued existence.

3. Map and quantify the number of high-density populations of *Coryphantha robbinsorum* in the U.S.

As indicated above, only three populations of Cochise pincushion cactus have been mapped or delineated. These three populations were established as long-term monitoring plots by the USFWS in 1988 and 1989 (Rutman 1989, Schmalzel 1995). No additional mapping or delineation of populations has occurred in the U.S. The literature contains some indication of the presence or absence of the Cochise pincushion cactus in areas of Arizona in the U.S., but occupied areas were not mapped in any detail (Phillips and Brian 1982, Zimmerman 1985, Hilsenbeck 1991). Mapping of populations in Mexico may occur as part of the 2007 surveys that will be conducted by Dr. Van Devender. This recovery criterion addresses Listing Factor A – the present or threatened destruction, modification, or curtailment of its habitat or range, and Listing Factor E – other natural or manmade factors affecting its continued existence.

4. Eliminate or minimize the threat of surface-disturbing activities, particularly oil and gas drilling and mineral entry.

As a recovery criterion, this means that threats to the Cochise pincushion cactus related to surface disturbance would need to be eliminated or minimized prior to considering delisting of the species. While most of the threats identified in the recovery plan, including those related to oil and gas drilling and mineral entry, have not been realized, there have been no specific actions undertaken to eliminate or minimize these threats. The potential still remains, especially in the face of reduced energy resources, for surface-disturbing activities to occur within the range of the Cochise pincushion cactus. Under the current system, anyone can apply for a mineral exploration or oil/gas lease on any parcel of State Trust land by simply filing a complete application package. In addition, activities associated with illegal immigration and drug smuggling have been identified as potential threats, both direct and indirect, to this species. This recovery criterion addresses Listing Factor A - the present or threatened destruction, modification, or curtailment of its habitat or range.

5. Commercial trade protection provided by the Arizona Native Plant Law and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) must remain in place following removal from the Federal list of endangered and threatened species.

As the Cochise pincushion cactus has not been removed from the Federal list of endangered and threatened species, this recovery criterion is not relevant. The Cochise pincushion cactus remains protected under CITES, and is included in Appendix II. This recovery criterion addresses Listing Factor B – overutilization for commercial, recreational, scientific, or educational purposes and Listing Factor D – the inadequacy of existing regulatory mechanisms.

Updated Information and Current Species Status

<u>New information on the species' biology and life history</u>

The Cochise pincushion cactus is a small (1.4-6 cm in diameter), unbranched cactus scattered among several limestone hills in southeastern Cochise County, Arizona. At least one population is known from northern Sonora, Mexico. This small cacti is covered by white, cottony, areoles and the radial spines overlap with the areoles, giving the cacti an overall whitish appearance. The flowers are pale yellow or light beige and are produced in early spring (March). Fruits are orange-red to scarlet and may contain up to 20 seeds. Most of the stem is underground, with only the top 1 cm visible above ground. During droughts and seasonal dry times, the cacti shrink or retract into the soil, making them difficult to see.

The cacti are located on Permian limestone hills, at elevations ranging from 1,280 to 1,433 m. The soils are low in nutrients, with a pH of 7.9 to 8.0. Plants require well-drained substrates and grow in full sunlight. Dense colonies of the cacti occur on bedrock, with very little soil. Within their limited habitat (10-16 sq. km), the plants are found scattered, with a few dense clumps ranging from 100-1,000 individuals (Zimmerman 1985).

There has been no additional work completed on the biology and life history of the Cochise pincushion cactus. The entirety of work completed on these aspects was accomplished by Zimmerman in the late 1970's and early 1980's (Zimmerman 1978 and 1985). Long-term monitoring plots established in 1988 and 1989 have been read on an annual basis by USFWS and volunteers. The demographic data have not been analyzed since 1995 (Schmalzel et al. 1995). The recovery plan identifies several aspects of the life history of the Cochise pincushion cactus that warrant additional investigation. This continues to be true today and includes:

- the effects of climate;
- the effects of grazing;
- impacts of mammalian depredation;
- impacts of insect depredation;
- substrate requirements;
- plant interactions;
- reproductive biology, including pollination and dispersal ecology; and
- community structure.

<u>Abundance, population trends (e.g. increasing, decreasing, stable), demographic features (e.g., age structure, sex ratio, family size, birth rate, age at mortality, mortality rate, etc.), or demographic trends</u>

In 1988 and 1989, the USFWS established three long-term monitoring plots for the Cochise pincushion cactus (Rutman 1989). These plots were established to look at demographic trends for this species over a period of 10-15 years. These plots have been monitored annually through 2006, with few exceptions (1999 – 2000, 2004 – 2005), when border issues presented significant threats to the safety of field personnel. Schmalzel et al. (1995) presents a summary of this monitoring data for the period 1988 through 1993.

Overall, from 1988 through 2006, there has been a continuing decline of the number of individual cacti within the plots (Figure 1). There has been little or no recruitment of juveniles over the past five years. The highest incidence of mortality occurred in 1994 as a result of insect depredation (Figure 2).

Genetics, genetic variation, or trends in genetic variation (e.g., loss of genetic variation, genetic drift, inbreeding, etc.)

No work has been done on the genetics of the Cochise pincushion cactus. Because of its rare, isolated, and small population size, genetic drift and loss of genetic variation may play a role in the observed reduced reproduction in the monitored populations.

Taxonomic classification or changes in nomenclature

There has been no change in the taxonomy of the Cochise pincushion cactus. Its taxonomic status remains the same as described in the recovery plan (USFWS 1993).

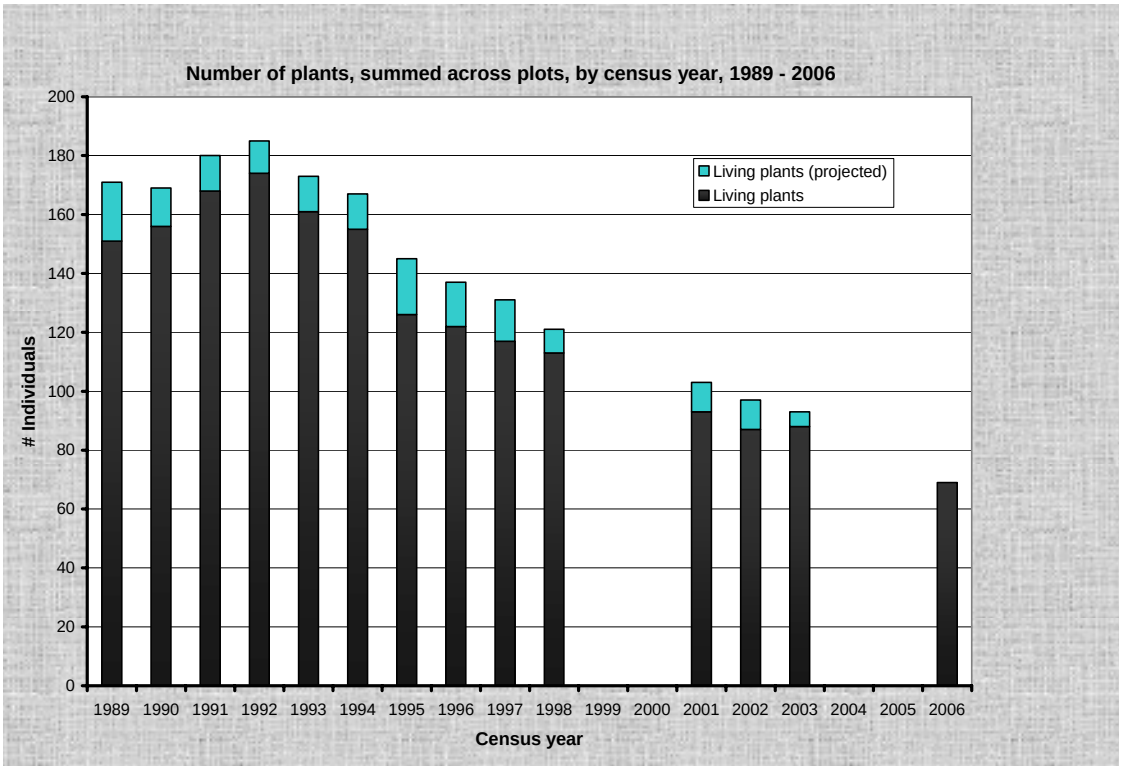

Figure 1. Number of Cochise Pincushion Cacti in Long-Term Monitoring Plots, 1989 – 2006

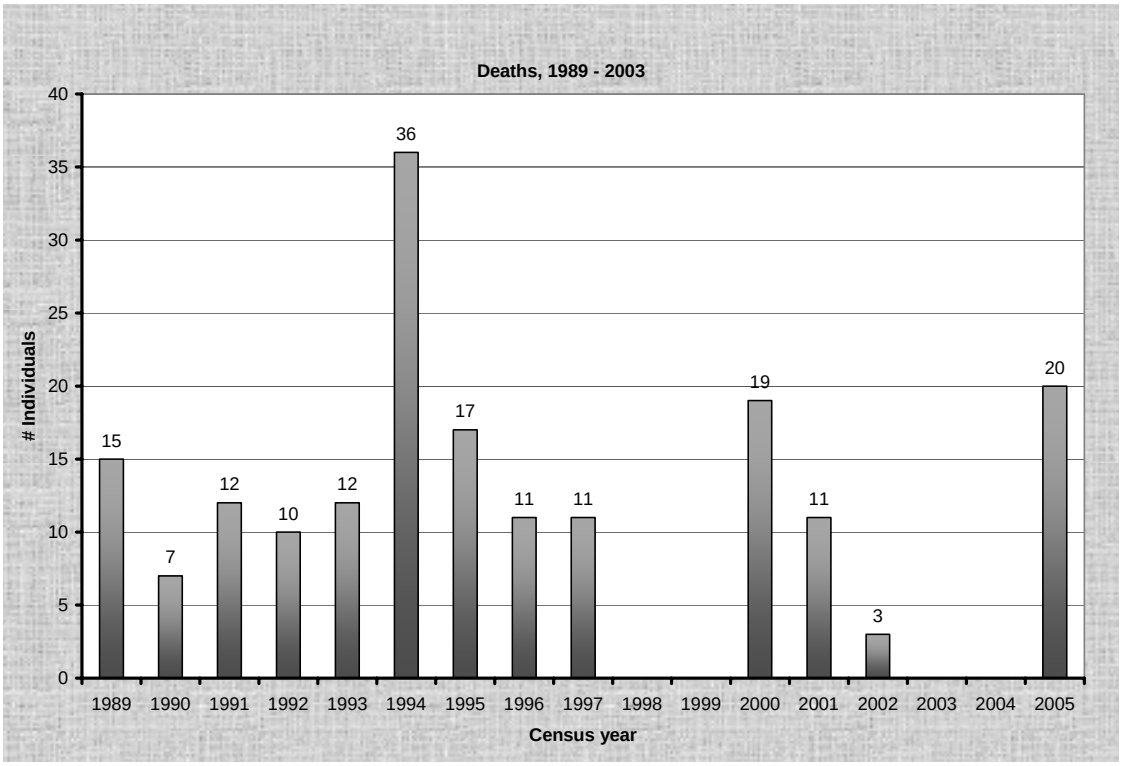

Figure 2. Number of Mortalities of Cochise Pincushion Cactus in Long-Term Monitoring Plots, 1989-2005

Spatial distribution, trends in spatial distribution (e.g. increasingly fragmented, increased numbers of corridors, etc.), or historical range (e.g. corrections to the historical range, change in distribution of the species' within its historical range, etc.)

No additional work has been completed on the distribution of the Cochise pincushion cactus. Our understanding of the historical and current range of this species remains the same as described in the recovery plan (USFWS 1993). A section 6 grant was awarded to Dr. Tom Van Devender to investigate the distribution of this species in Mexico. The results of this work are expected in 2007. Plants within the three long-term monitoring plots show an overall decrease, but we cannot extrapolate beyond these plots to other populations because of the small sample size represented by the monitoring plots. Other populations may not be showing this same decline as populations may be controlled by density-dependent factors such as moth and beetle depredation. A change in monitoring techniques is probably warranted in order to gain a better understanding of population trends across the range of the species. A larger portion of the range and suitable habitat should be sampled to capture landscape-scale population and distribution trends.

Habitat or ecosystem conditions (e.g., amount, distribution, and suitability of the habitat or ecosystem)

Southeastern Arizona has been experiencing long-term drought conditions since 2000. Survival and reproduction of the Cochise pincushion cactus seems to be affected by the ongoing lack of

precipitation. It remains to be seen if populations will recover if/when the effects of the drought are over. In addition, areas along the U.S./Mexico border continue to see resource damage as a result of illegal immigration and drug smuggling. The topography of the area where the Cochise pincushion cactus occurs makes this area favorable for illegal border traffic and enforcement activities. Trampling and ground disturbance resulting from border activities remains a potential threat to this species. Law enforcement officers with the SBNWR have been patrolling the areas occupied by the cactus and have shifted foot traffic away from occupied habitat. The local landowner and lessee of state trust lands in the area is also a Federal law enforcement officer who has shown ongoing vigilance in protecting Cochise pincushion cactus populations from border activities and other threats.

Other

There has been no evidence of illegal collecting of Cochise pincushion cacti within the known populations. The ongoing vigilance of the local landowner and law enforcement personnel has limited the potential for the occurrence of this activity.

One of the recovery actions outlined in the Cochise pincushion cactus recovery plan is to establish an *ex situ* conservation and research program (USFWS 1993). Some work has been accomplished by the Desert Botanical Garden (DBG) in Phoenix, Arizona. Recent information from the DBG and permit reports from 1993, 1996 and 1997 (Pritchett-Kozak 1993, Slauson 1996, Slauson and Rice 1997, Rice 2006) provide the following summary of activities conducted at DBG related to the Cochise pincushion cactus.

DBG has only two field seed collections of Cochise pincushion cactus, both obtained from a population occurring on State Trust land. The first collection was made in 1987, when 812 seeds were collected; there was some question whether the seeds were mature at the time of collection. As opportunities for collection were limited, the seeds were collected anyway, but subsequent germination tests failed. The seeds had been immediately frozen following cleaning and counting, prior to establishing a baseline germination percentage. If the seeds were not fully mature, it is possible that freezing may have killed the developing embryos. Another speculation evolving from the failure to germinate seeds collected from any of the plants was that freezing may not be appropriate for some seeds of desert plants, notably members of Cactaceae.

Experimentation with some other species of cactus has provided similar results. The protocol for the storage process for Cactaceae is being re-examined at DBG. Another collection was made from the same site during 1995, allowing only five seeds to be taken from each of 50 plants.

During 1999, all available plants were purchased from a local grower, who assured DBG that the plants were legally obtained. The grower had provided a few individuals for the DBG plant sale and since DBG had none in their living collection (except possibly for the latest seed collection), DBG asked for additional specimens, and received 33 individuals that were approximately 2 cm

in diameter. These plants immediately flowered at the time they normally would have, and controlled cross-pollinations were conducted, producing 78 fruits and a total of 2,827 seeds. The seeds were allowed to dry in the partially dry fruits, and were then cleaned and counted by hand. They were stored in an airtight foil pouch after 6 weeks of drying. Germination tests have not yet been conducted on this latest accession. These small cacti may only produce 1,200 seeds in a lifetime, so establishment of a seed bank for this species will take time, as several field collections will be necessary in order to collect an adequate sample. Until germination tests provide more definite results, DBG maintains a conservative approach to augmenting the seed bank it has established. The DBG currently maintains 44 accessions (40 lineages) of Cochise pincushion cactus, including 4 plant accessions and 40 seed accessions (Rice 2006).

Five-Factor Analysis (threats, conservation measures, and regulatory mechanisms)

Present or threatened destruction, modification or curtailment of its habitat or range

The potential threats to Cochise pincushion cactus habitat outlined in the recovery plan (USFWS 1993) have not changed significantly. These threats include grazing by livestock and wildlife, and oil/mineral exploration activities. Changes in grazing patterns by the local landowner have minimized the potential effects from livestock grazing. Impacts to populations from mining activities have not been a significant factor. However, each of these activities continues to be a potential threat to populations of Cochise pincushion cacti. Impacts from these threats could increase if land ownership changes or incentives for oil and mineral exploration increase.

A new threat that has been escalating over the past 10 years is related to illegal immigration and drug smuggling, and associated law enforcement activities. Plants can be trampled or otherwise damaged or injured. Cochise pincushion cactus habitat is destroyed or altered by foot and vehicle traffic, and there is the potential for the increased incidence of fire. Impacts from border activities have been documented within areas occupied by the Cochise pincushion cactus, but increased law enforcement efforts have, at least temporarily, reduced illegal traffic in the area. Proposals by the Department of Homeland Security and Border Patrol to erect fences and increase patrol roads have the potential to affect this species due it proximity to the U.S./Mexico border.

An additional threat comes in the form of invasive plant species, especially grasses. Of particular note is the spreading threat to Sonoran and Chihuahuan desert ecosystems resulting from the invasion of buffelgrass (*Pennisetum ciliare*). Buffelgrass can compete for resources with Cochise pincushion cactus, and it also increases the frequency and intensity of fire on the landscape as compared to natural conditions. Such a change in the fire regime could increase Cochise pincushion cactus mortality and alter important habitat microclimates. The recent development of a cold-tolerant strain of buffelgrass by the Agricultural Research Service (2005) increases the potential for this species to invade areas occupied by the Cochise pincushion cactus. Lehmann's lovegrass (*Eragrostis lehmanniana*) is another invasive grass species in southeastern Arizona.

Overutilization for commercial, recreational, scientific, or educational purposes

Illegal collecting of this species was identified as a potential threat in the recovery plan and listing documents (USFWS 1986 and 1993). The desirability of this species, coupled with its limited distribution, increases the potential for significant impacts to populations if illegal collection were to occur. No evidence of illegal collection within known populations has been observed. However, collection remains a real threat to this species due to its limited numbers and distribution. Cochise pincushion cacti are available commercially on a limited basis, but if interest in this species increases or commercial availability decreases, pressure to collect plants from the wild may increase. The unique, rare nature of this species increases its desirability among collectors.

Concern has also been expressed regarding potential trampling of individual cacti by biologists and volunteers during the monitoring of the long-term monitoring plots. Because monitoring requires an intense, thorough search of each plot, there is the potential for damage to some individual cacti during monitoring. However, these plots are typically monitored by the same individuals each year, who are very aware of the need to avoid trampling or damaging the cacti. It is unlikely that monitoring activities result in significant effects to populations of the Cochise pincushion cactus. The potential for trampling is further reduced by the fact that these cacti are very small and grow in rocky, limestone areas which protect them.

Disease or depredation

There is no evidence that disease is a significant factor in the mortality of the Cochise pincushion cactus. However, the stress placed on plants during the ongoing drought may make them more vulnerable to disease. Documenting any effects from disease should be an objective of ongoing monitoring.

Depredation by insects was documented in the Cochise pincushion cactus long-term monitoring plots in 1994. As a result, mortality of individual plants during that year nearly doubled from the highest mortality previously recorded (see Figure 2). The documentation of this significant depredation event points to the potential for the distribution of this species to be driven by density-dependent insect depredation. As the density of Cochise pincushion cacti increases in a local population, it becomes more vulnerable to insect depredation. At some point, densities may become high enough that conditions favor a significant insect depredation event. Density of cacti is reduced, as is the subsequent depredation by insects. This cycle may repeat itself over time within each of the local populations of Cochise pincushion cactus. As a result, there may be a number of high-density populations within the landscape; however, the density of these populations would eventually be reduced by insect depredation. Low-density populations will gradually increase in density during favorable environmental conditions until they reach a point that favors insect depredation events. In order to determine if this cycle of depredation is indeed a natural component of the population dynamics of the Cochise pincushion cactus, monitoring techniques must be modified to sample the population across its range. Depredation may be a significant driver of the distribution and density of this species. Depredation effects would be amplified in populations suffering from others stressors such as drought.

It is likely that mammalian depredation also affects the survival and productivity of Cochise pincushion cacti. Mammals such as woodrats, jack rabbits, and javelina likely consume Cochise pincushion cacti on occasion. This depredation is natural, but likely occurs at such low levels that significant population effects have not been observed, and are not anticipated.

Inadequacy of existing regulatory mechanisms

Nothing has changed with regard to existing regulatory mechanisms related to the Cochise pincushion cactus outlined in the listing document and recovery plan (USFWS 1986 and 1993). The species is still protected under the Arizona Native Plant Law and is listed as an Appendix II species under CITES. The development of a management plan as directed by the recovery plan has not been completed; its development would be beneficial to this species.

Other natural or manmade factors affecting its continued existence

Ongoing, long-term drought is occurring within the range of the Cochise pincushion cactus. Drought increases mortality of adults and juveniles and reduces reproduction in populations of this species. Because of the limited number of individual plants and the limited distribution of this species, drought effects may significantly affect its ability to persist on the landscape. A return to normal winter and monsoon precipitation patterns is needed to decrease this threat. The declining trend in numbers of cacti within monitoring plots is likely evidence of the effects of drought on known populations.

Zimmerman (1985) noted several species of native insects pollinating Cochise pincushion cactus flowers. Nothing is known about the life history or habitat requirements of the native pollinators in relation to the Cochise pincushion cactus. Other beneficial insects may facilitate pollination and the dissemination of seeds. Application of pesticides within or adjacent to the range of the Cochise pincushion cactus could adversely affect these insects and associated ecosystem functions. The potential application of pesticides is most likely associated with rangeland grasshopper control. While we are not aware that such spraying of pesticides has occurred since the recovery plan was finalized, the application of pesticides remains a potential threat to insects that benefit the Cochise pincushion cactus.

Synthesis

The Cochise pincushion cactus is a narrowly distributed, endemic species restricted to three small limestone hills in Cochise County, Arizona, along the U.S./Mexico border. At least one additional population has been described in Sonora, Mexico, directly across the border from the populations in the United States (Lopresti 1984). The species was listed as threatened in 1986 because of its small population size and threats related to collecting, potential minerals exploration and mining, and habitat degradation from livestock and wildlife. Because none of these conditions has changed since listing, we recommend no change in the status of the Cochise pincushion cactus.

Three long-term monitoring plots were established in 1988 and 1989, and these plots have been monitored annually since their establishment. Initial trends within these plots were stable or

increasing, however, within the past five years an overall decline in the number of individual plants and in reproduction has been noted. This decline appears to coincide with the ongoing long-term drought occurring in southeastern Arizona. Because population numbers appear to be declining based on current data, we are recommending continued protection under the Endangered Species Act.

Identified threats have not resulted in significant impacts to known populations. However, a new threat, in the form of increased illegal border activity and associated law enforcement, has had and continues to have the potential to affect the habitat and populations of Cochise pincushion cactus. Ongoing threats to this rare species suggest continued protection under the Endangered Species Act is appropriate.

There is an absence of new information related to this species. No section 7 consultations have been conducted for this species. The state of our recent knowledge regarding the Cochise pincushion cactus is limited to the information gathered from the long-term monitoring plots. These data were summarized for the period 1988 – 1993 (Schmalzel et al. 1995), but have not been analyzed since then beyond basic summary statistics. Only six of the 23 recovery actions have been initiated, and none have been completed. While recent data suggest population declines within the long-term monitoring plots, we cannot extrapolate this information to other populations. Because of the limited scope of ongoing work, we have no way of knowing if the decline is the result of some density-dependent factor, the ongoing drought, or some other factor or combination of factors. Other populations may not be undergoing these same trends. While information is forthcoming about the populations in Mexico, we are currently unaware of their status. It would be inappropriate at this point to recommend elevating the status of the Cochise pincushion cactus to endangered.

RESULTS

Recommended Classification:

____ Downlist to Threatened
____ Uplist to Endangered
____ Delist (*Indicate reasons for delisting per 50 CFR 424.11):*
____ *Extinction*
____ *Recovery*
____ *Original data for classification in error*
_XX_ No change is needed

New Recovery Priority Number: No change

Brief Rationale: Not recommending a change in status

Listing and Reclassification Priority Number: Not applicable.

RECOMMENDATIONS FOR FUTURE ACTIONS (Prioritized)

1. Modify the current monitoring protocol to expand the area monitored within the known range of the species. Design the protocol to more effectively evaluate the status of the species across the landscape. Monitoring should be designed to investigate possible density-dependent depredation issues and identify the distribution of both high-density and low-density populations.

2. Update the recovery plan with quantifiable criteria for delisting. For example, a goal of establishing 15,000 plants in 50 populations (Recovery Criteria #2) may not be realistic based on current information of the density and distribution of this species.

3. In conjunction with #2, evaluate the existing recovery actions outlined in the existing recovery plan and decide which are still appropriate for the species' recovery, based on current information.

4. Evaluate the results of Dr. Tom Van Devender's 2007 work on this species in Mexico and increase monitoring efforts in Mexico, if appropriate.

5. Continue to coordinate with and involve the landowners/lessees and SBNWR in recovery actions related to the Cochise pincushion cactus.

6. Evaluate the genetics of this species to determine variation within and among populations. This information is useful in determining if population augmentation or establishment of new populations is warranted.

REFERENCES

Individuals Contacted

Kathy Rice, Desert Botanical Garden
Sue Rutman, Organ Pipe Cactus National Monument
Dr. Tom Van Devender, Arizona-Sonora Desert Museum
Alan Zimmerman, Independent Researcher
Bill Radke, Refuge Manager, SBNWR

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U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW OF THE
COCHISE PINCUSHION CACTUS

Current Classification: Threatened

Recommendation resulting from the 5-Year Review:

____ Downlist to Threatened
____ Uplist to Endangered
____ Delist
__xx__ No change needed

Appropriate Listing/Reclassification Priority Number, if applicable: N/A

Review Conducted By: Scott Richardson, AESO, Tucson Suboffice
Mima Falk, AESO, Tucson Suboffice

FIELD OFFICE APPROVAL:

Acting
Lead Field Supervisor, Fish and Wildlife Service

Approve Debra T. Bills Date 3/22/07

REGIONAL OFFICE CONCURRENCE:

Acting
Assistant Regional Director, Fish and Wildlife Service (Ecological Services)

Concur Nancy J Gloman Date 4/6/07

Do Not Concur _____ Date _____